

# Cucurbit Grafting

Emily Silverman

# Grafting Cucurbits

## Cucurbits:

- Cucumber
- watermelon
- other melons

**There are three methods widely used**

- hole-insertion grafting
- one cotyledon grafting
- approach grafting



## Why use Cucurbit grafting?

Promotes plant vigor

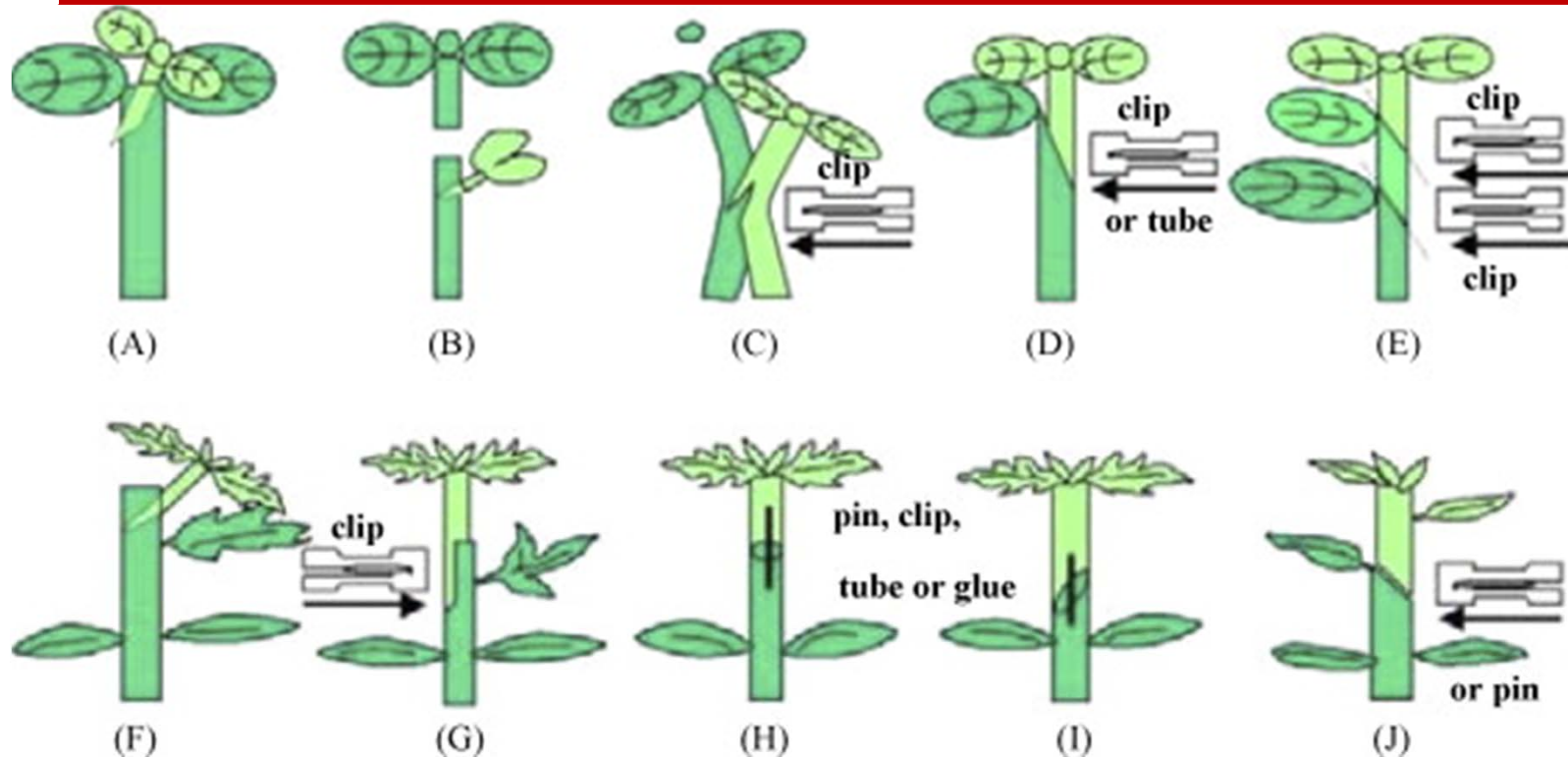
Increased yield in presence of disease

Tolerance to abiotic stresses

Resistance to soilborne plant pathogens



# Diagram of Grafting Methods:



(A and B) hole insertion grafting  
(D, E and J) splice grafting  
(F, G) cleft grafting

(C) tongue approach grafting  
(H and I) pin grafting

# Hole insertion grafting (HIG)

- Commonly used for watermelons
- The rootstocks used in watermelon grafting are usually squash or bottle neck gourd
- Watermelon scion seedling size needs to be smaller than the rootstock seedlings
- Watermelon seeds are sown 7–8 days after the sowing of gourd rootstock seeds or 3–4 days after sowing squash rootstock seeds
- Grafting is made 7–8 days after the sowing of watermelon seeds
- The true leaf including the growing point should be carefully and thoroughly removed with a scoping motion
- A hole is made with a bamboo or plastic gimlet or drill at a slant angle to the longitudinal direction in the removed bud region
- The hypocotyl portion of the watermelon scion is prepared by slant cutting to a tapered end for easy insertion into rootstock hole
- The grafted plant is placed into a healing chamber

[Jung-Myung Lee](#), [C. Kubota](#), [S.J. Tsao](#), et al.

Current status of vegetable grafting: Diffusion, grafting techniques, automation. *Science Horticulturae*, 2010. V(127) Iss. 2, P93-105.

# Tongue approach grafting (TAG)

- Scion and rootstock seedlings need to be similar height and stem diameters
- The seeds of scion
  - usually watermelons, cucumbers, and melons
  - Sow scion seed 5–7 days earlier than the rootstock seeds
- The growing point of the rootstocks should be carefully removed before grafting
- One cotyledon may also be removed when removing the growing point to ensure complete removal of the growing point and to avoid overcrowding in the healing chamber
- The grafting cut for rootstock should be made in a downward direction and the scion cut in an upward direction at an angle, usually 30°–40° to the perpendicular axis
- Grafting clips are placed to fix the graft position at the graft union site
- Grafted plants are then planted together in container
- After healing the rootstock top is removed and the scion roots are cut

# Splice grafting (SG), tube grafting (TG), and one cotyledon splice grafting (OC-SG)

- Splice grafting can be done by hand, machine, or robot and can be applied to most vegetables
- For the cucurbit rootstocks, 1 cotyledon and the growing point are removed for grafting
- After placing the scion on the rootstock grafting clips are used to fix the grafted position at the union site
- This is the most common methods for cucurbits and also called as one cotyledon splice grafting (OC-SG)
- For solanaceous crops, grafting is usually made at lower epicotyl and fixed with grafting clips, elastic tube-shaped clip with side slit, or ceramic pins
- Tube grafting is performed by holding the grafted position together in a slit elastic tube rather than using the usual grafting clips
- The tube may be used several times depending upon the materials.

# Cleft grafting (CG)

- Cleft grafting in herbaceous plants may be somewhat different from those of woody plants
- Usually a portion of the stem is cut longitudinally
- The rootstock seedlings are decapitated and longitudinal cut is made in a downward direction, 1–1.5 cm long and 3/4 depth of the stem diameter
- The scion is pruned to have 1–3 true leaves and the lower stem is cut to slant angle to make a tapered wedge
- After placing the scion into the split made on the rootstock, a clip is placed to hold in position until the union
- Various types of grafting clips, differing in material, size, shape, and others, have been developed for cleft grafting
- Cleft grafting had been used in cucurbits for a while in several countries, but the use is usually confined to solanaceous crops

# Pin grafting (PG)

- Pin grafting is basically the same as the splice grafting
- Instead of placing grafting clips to hold the grafted position, specially designed pins are used to hold the grafted position in place
- The ceramic pin developed by Takii Seed Co., in Japan is about 15 mm long and 0.5 mm in diagonal width of the hexagonal cross-section
- The pins are made of natural ceramic so it can be left on the plant without any problem





# Healing:

- Keep 95% relative humidity in healing chamber
- Temp 28-29C (82-84F) in the humidity chamber – Increase callus formation at union
- Darkness for 1-2 days and ween into light
- Cover healing chamber with two 70% green mesh shade cloth and one layer of 100% black shade cloth.
  - Remove black shade cloth after 2 days
  - Remove one layer of green mesh shade cloth 2 days
  - Remove the final layer of green mesh shade cloth after 2 more days
  - Leave in the healing chamber an additional day
  - Take out of healing chamber and put plants into greenhouse conditions

# Cucurbit Grafting Methods:

- Hole insertion grafting is the most popular grafting method in watermelon
- In cucumbers, tongue insertion grafting is most popular method
- In eggplant, split grafting is preferred
- In summary, small-scale farmers select tongue approach grafting for most vegetables whereas large-scaled experienced professional seedling producers like to adapt splice grafting
- Manual or hand grafting is by far the major grafting method even though several grafting machines and semi-automatic machines or robots have been developed and commercially available.

# QUESTIONS?



Tomato



Cucumber



Eggplant and Tomato



Tomato grafted on Potato



Dr. Louws